

CLAIMS:

1. A microelectrode system comprising a laminated structure having at least one conducting layer capable of acting as an electrode, at least one dielectric layer, an aperture formed in the laminated structure, and contact means for allowing electrical contact with at least one conducting layer.

2. A microelectrode system as claimed in claim 1 wherein said aperture defines a uniform or non-uniform internal wall in the laminate structure.

3. A microelectrode system as claimed in claim 1 ~~or 2~~ wherein said aperture defines a substantially tubular internal wall in the laminate structure.

4. A microelectrode system as claimed in any preceding ^{Claim 1} claim comprising a plurality of apertures.

5. A microelectrode system as claimed in any preceding ^{Claim 1} claim wherein said aperture is a through hole which extends through the laminated structure and is open at both ends.

6. A microelectrode system as claimed in any of claims ~~4 to 4~~ ^{Claim 1} wherein the aperture is in the form of a well having an open end and an opposite end being closed to form a well bottom.

7. A microelectrode system as claimed in any preceding ^{Claim 1} claim wherein at least one conducting layer is functionalised.

8. A microelectrode system as claimed in any preceding ^{Claim 1} claim wherein at least one dielectric layer is made from a

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rubbery material having a solid state matrix capable of swelling in the presence of a liquid or gas.

9. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim wherein consecutive conducting layers are separated by dielectric layers.

10. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim wherein the laminate structure is constructed on a base comprising silicon or a polymeric material.

11. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim comprising at least one pair of substantially collinear wells having a common well bottom.

12. A microelectrode system as claimed in claim 11 comprising a plurality of pairs of substantially collinear wells having a common well bottom.

13. A microelectrode system as claimed in claim 11 ~~or~~ ^{Claim 1} 12 wherein said well bottom is formed from an ion exchange material.

14. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim wherein at least one conducting layer is metallic and treated with an organic conducting layer.

15. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim wherein at least one conducting layer is a silver/silver chloride reference electrode.

16. A microelectrode system as claimed in ~~any preceding~~ ^{Claim 1} claim wherein at least one conducting layer consists essentially of gold.

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17. A microelectrode system as claimed in claim 16, wherein at least one dielectric layer is polymeric and acts as a support for the gold conducting layer.

Claim 1
18. A microelectrode system as claimed in ~~any preceding~~ ~~claim~~ comprising means for assisting mass transport.

19. A microelectrode system as claimed in claim 18 wherein said means for assisting mass transport is a piezoelectric vibrator or ultrasonic probe.

Claim 1
20. A microelectrode system as claimed in ~~any preceding~~ ~~claim~~ comprising alternating conducting and dielectric layers.

Claim 1
21. A microelectrode system as claimed in ~~any preceding~~ ~~claim~~ wherein at least one dielectric layer comprises a specialised layer in the form of an ion exchange resin, gel or solid electrolyte.

22. A microelectrode system as claimed in claim 21 wherein the specialised layer is provided with means to apply physical or chemical gradients or potentials thereto.

Claim 1
23. A microelectrode system as claimed in ~~any preceding~~ ~~claim~~ wherein at least one dielectric layer comprises a reagent loaded or functionalised layer.

24. Use of a microelectrode system as claimed in any preceding claim for deionisation of a material.

25. Use of a microelectrode system as claimed in any of claims 1 to 23 for use in preparative electrochemistry.

26. Use of a microelectrode system as claimed in any of claims 1 to 23 for use in electroanalysis.

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27. Use of a microelectrode system as claimed in any of claims 1 to 23 for use as a sensor.

28. Use of a microelectrode system as claimed in any of claims 1 to 23 for use in chromatography or separation techniques.

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